Fig. 1 PRIOR ART

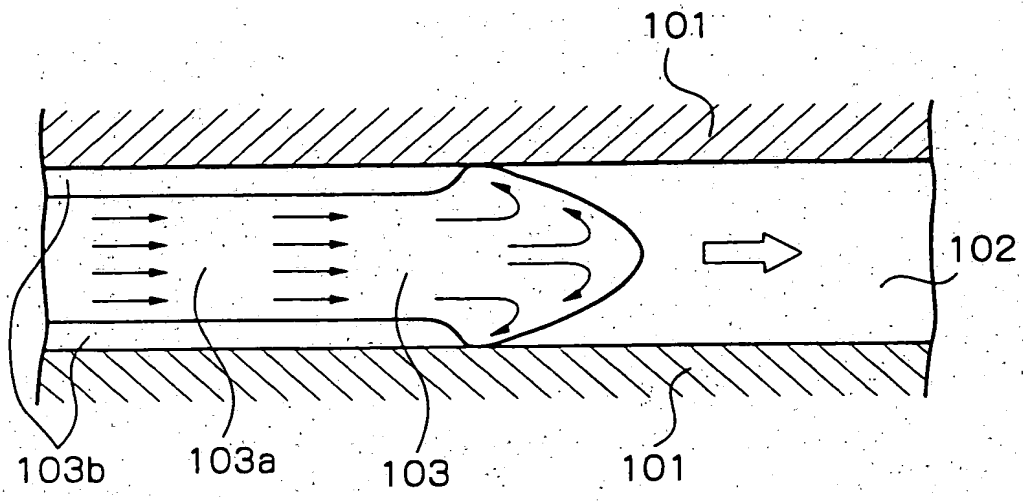


Fig. 2A

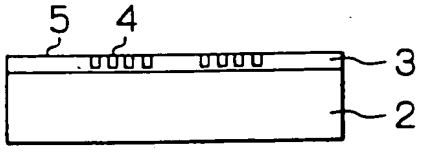


Fig. 2B

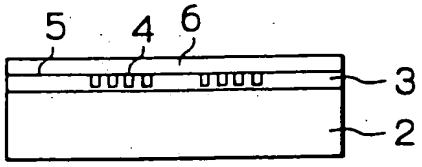


Fig. 2C

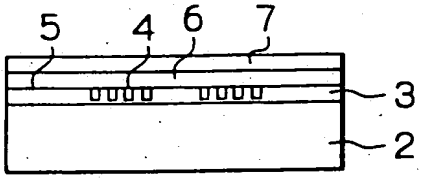


Fig. 2D

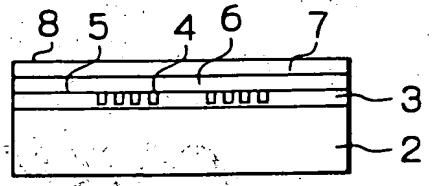


Fig. 2E

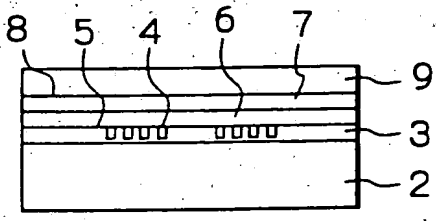


Fig. 2F

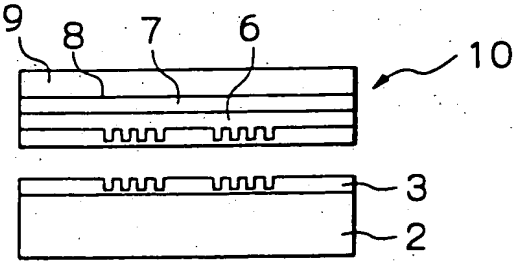


Fig. 3

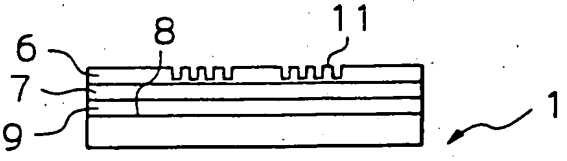


Fig. 4

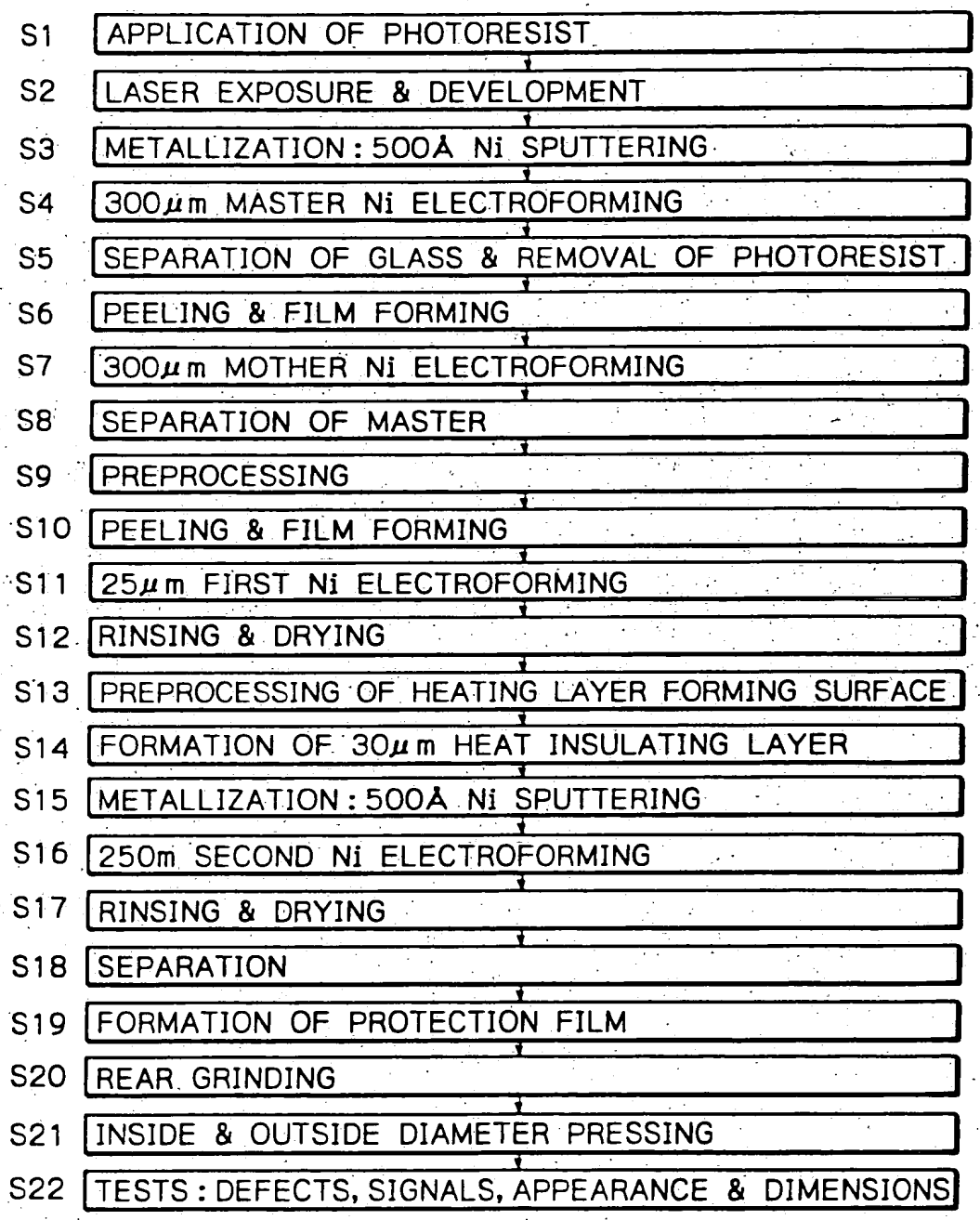

S1
APPLICATION OF PHOTORESIST
S2
LASER EXPOSURE & DEVELOPMENT
S3
METALLIZATION : 500Å Ni SPUTTERING
S4
300μm MASTER Ni ELECTROFORMING
S5
SEPARATION OF GLASS & REMOVAL OF PHOTORESIST
S6
PEELING & FILM FORMING
S7
300μm MOTHER Ni ELECTROFORMING
S8
SEPARATION OF MASTER
S9
PREPROCESSING
S10
PEELING & FILM FORMING
S11
25μm FIRST Ni ELECTROFORMING
S12
RINSING & DRYING
S13
PREPROCESSING OF HEATING LAYER FORMING SURFACE
S14
FORMATION OF 30μm HEAT INSULATING LAYER
S15
METALLIZATION : 500Å Ni SPUTTERING
S16
250m SECOND Ni ELECTROFORMING
S17
RINSING & DRYING
S18
SEPARATION
S19
FORMATION OF PROTECTION FILM
S20
REAR GRINDING
S21
INSIDE & OUTSIDE DIAMETER PRESSING
S22
TESTS : DEFECTS, SIGNALS, APPEARANCE & DIMENSIONS

Fig. 5A

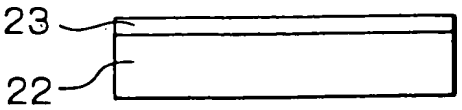


Fig. 5B

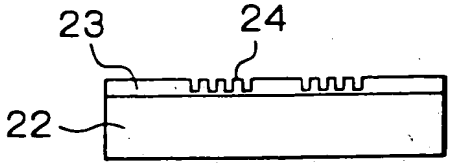


Fig. 5C

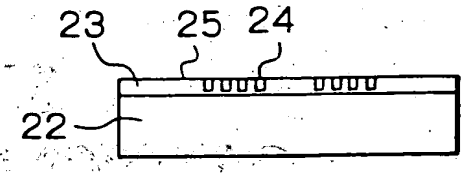


Fig. 5D

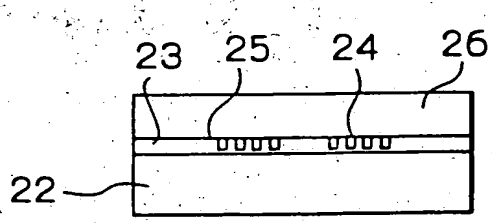


Fig. 5E

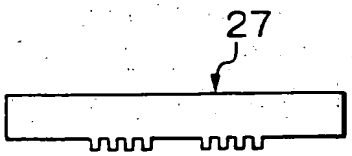


Fig. 5F

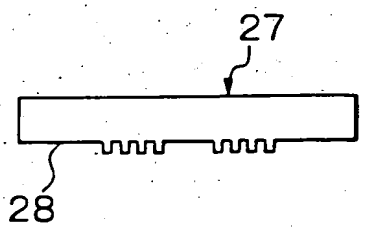


Fig. 5G

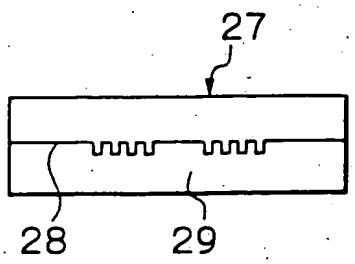


Fig. 5H

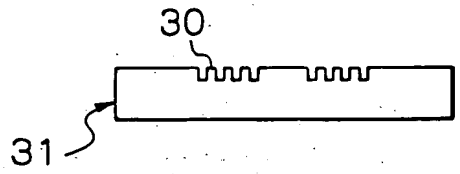


Fig. 5I

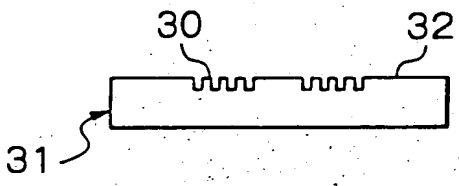


Fig. 5J

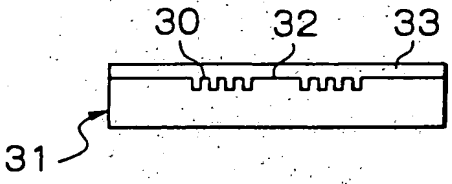


Fig. 5K

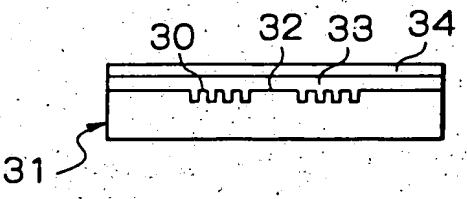


Fig. 5L

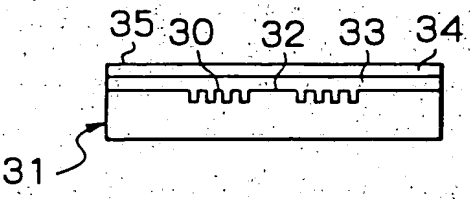


Fig. 5M

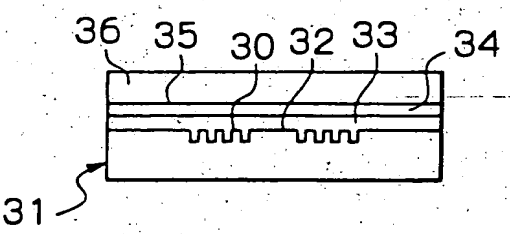


Fig. 5N

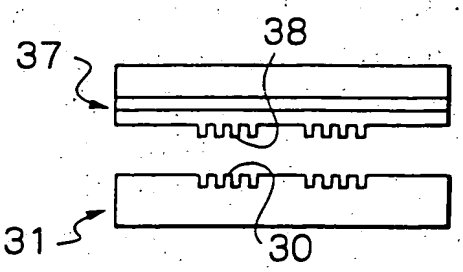


Fig. 6

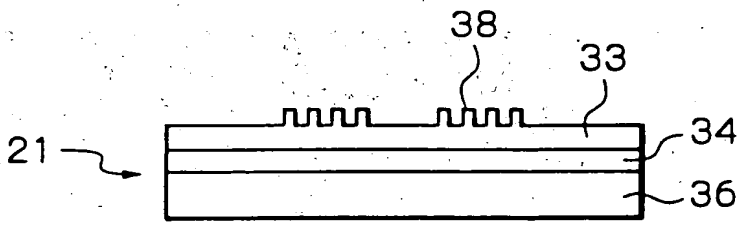

38
33
21
34
36

Fig. 7

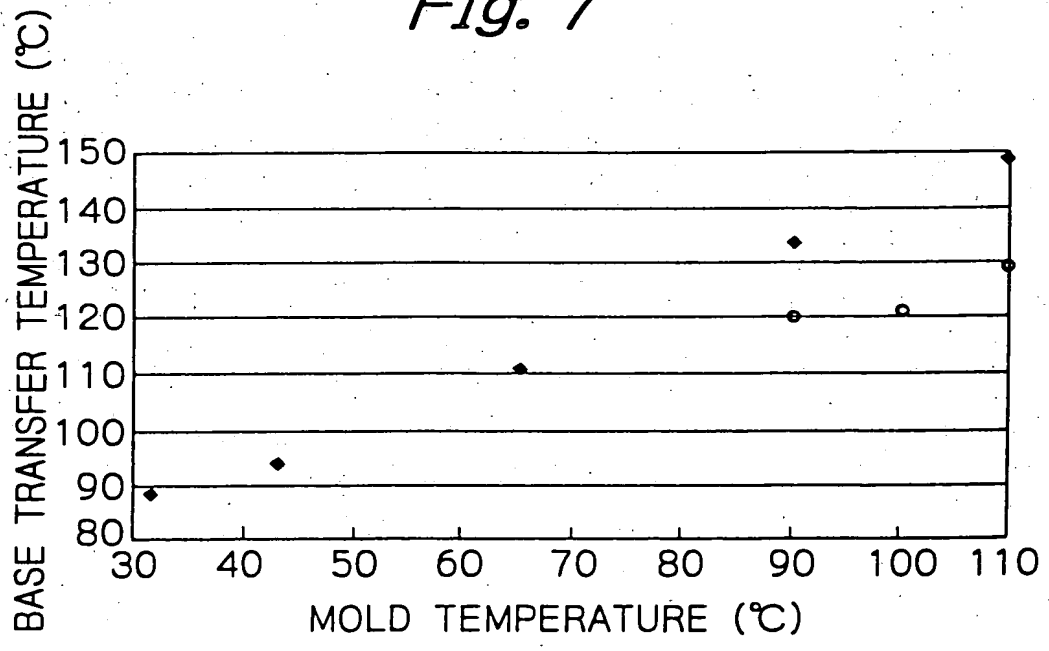

BASE TRANSFER TEMPERATURE (℃)
150
140
130
120
110
100
90
80
30
40
50
60
70
80
90
100
110
MOLD TEMPERATURE (℃)

Fig. 8

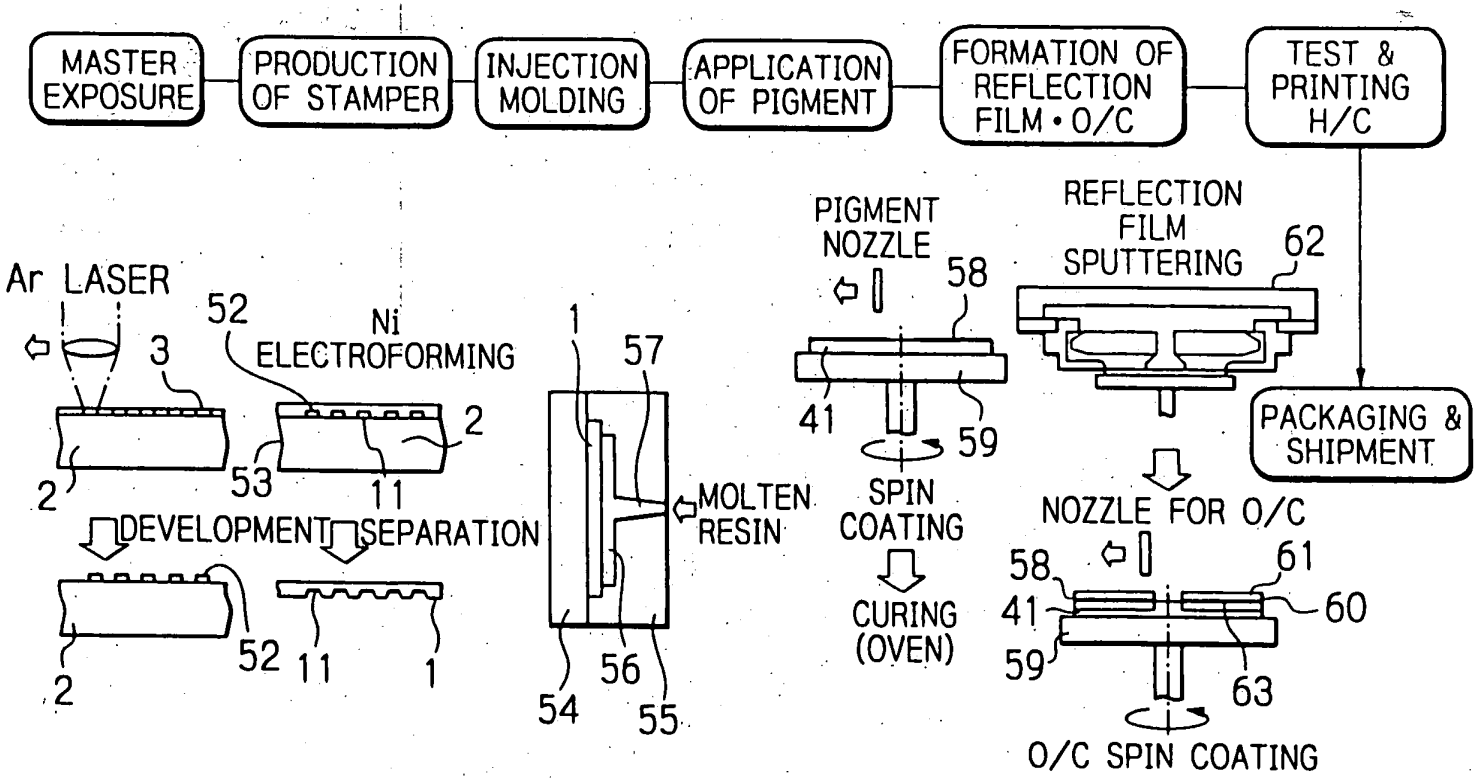

MASTER EXPOSURE
PRODUCTION OF STAMPER
INJECTION MOLDING
APPLICATION OF PIGMENT
FORMATION OF REFLECTION FILM • O/C
TEST & PRINTING H/C
Ar LASER
3
52
Ni ELECTROFORMING
2
2
53
11
DEVELOPMENT
SEPARATION
52
2
11
1
1
57
MOLTEN RESIN
54
56
55
PIGMENT NOZZLE
58
41
59
SPIN COATING
CURING (OVEN)
REFLECTION FILM SPUTTERING
62
PACKAGING & SHIPMENT
NOZZLE FOR O/C
58
61
41
60
59
63
O/C SPIN COATING

Fig. 9

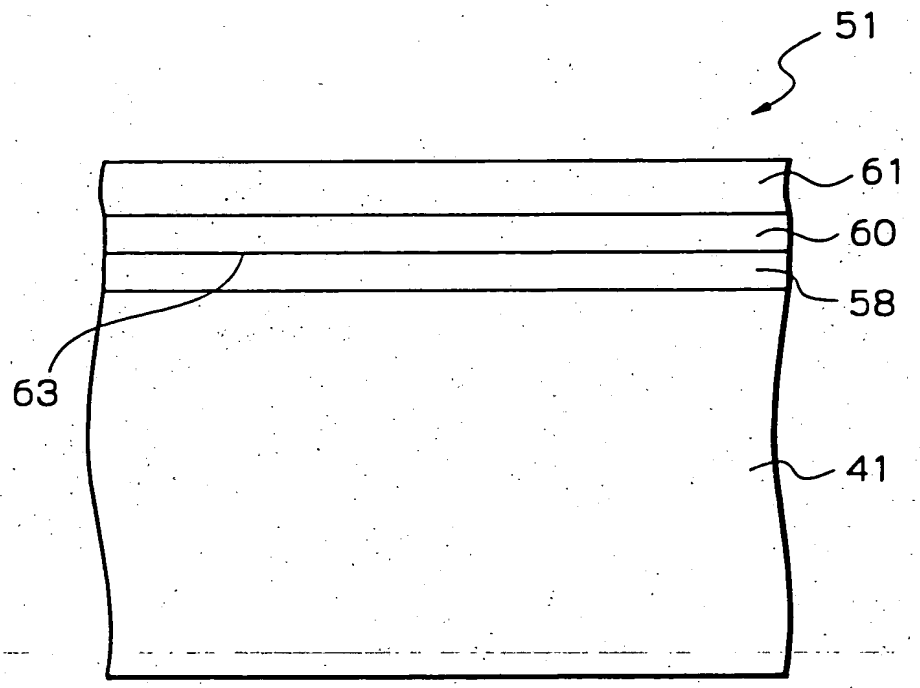


Fig. 10A

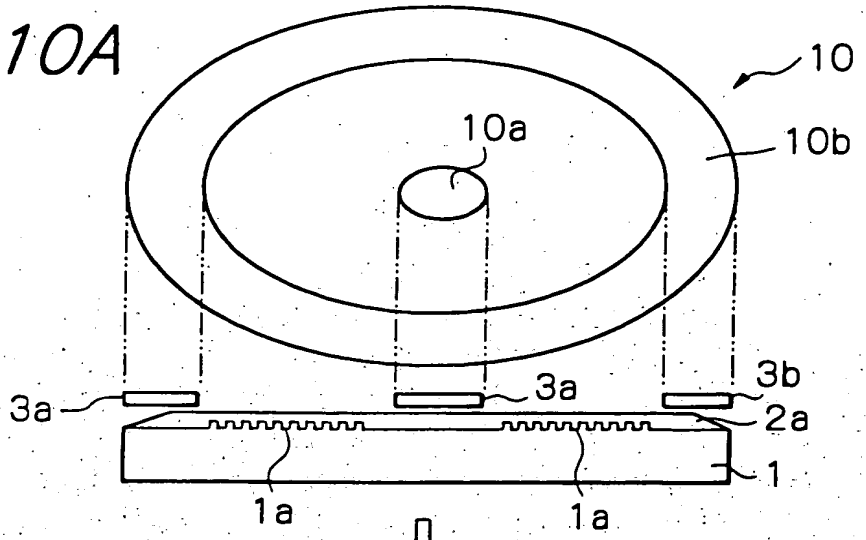


Fig. 10B

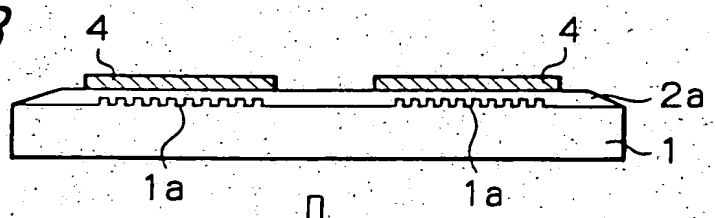


Fig. 10C

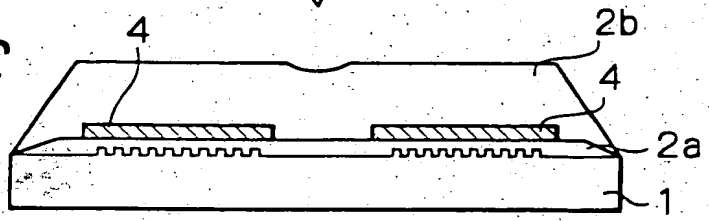


Fig. 10D

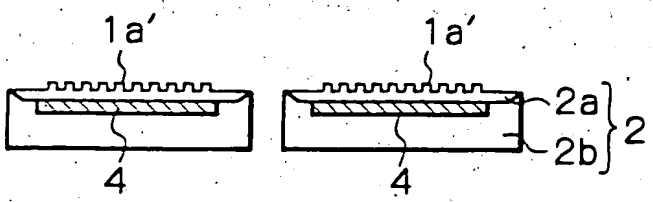


Fig. 11

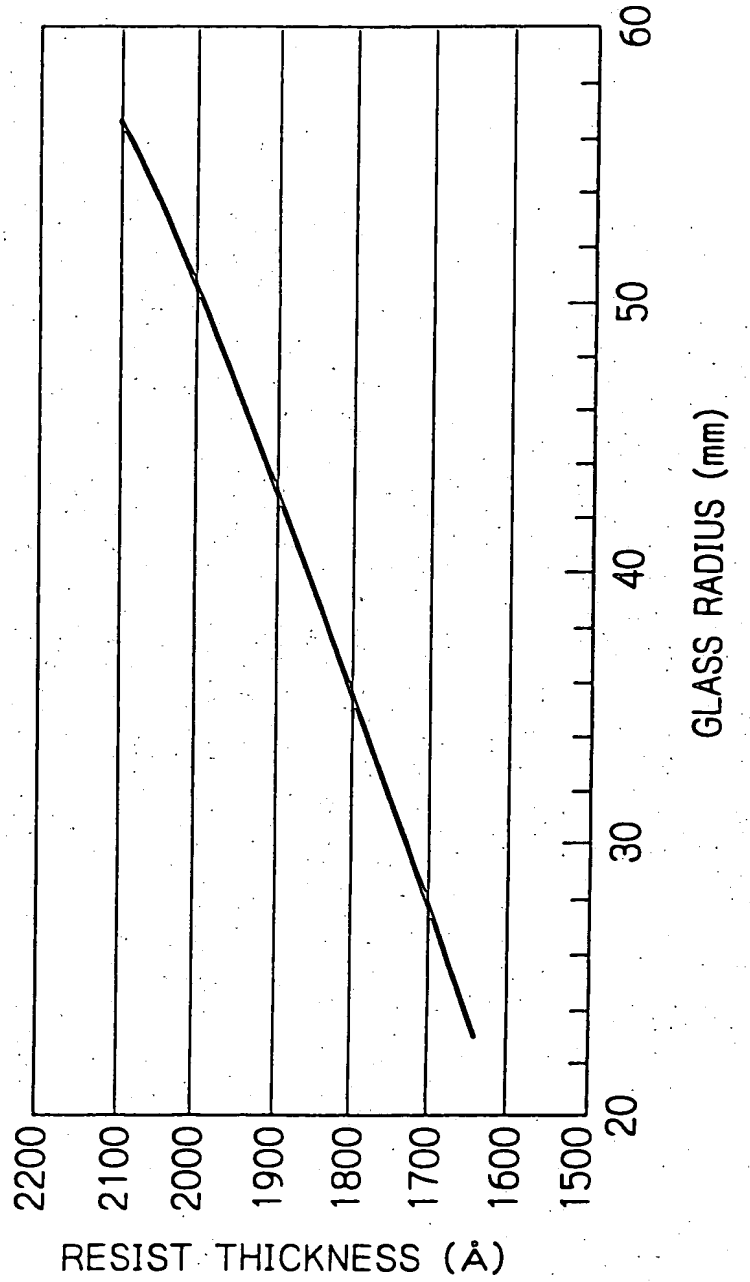
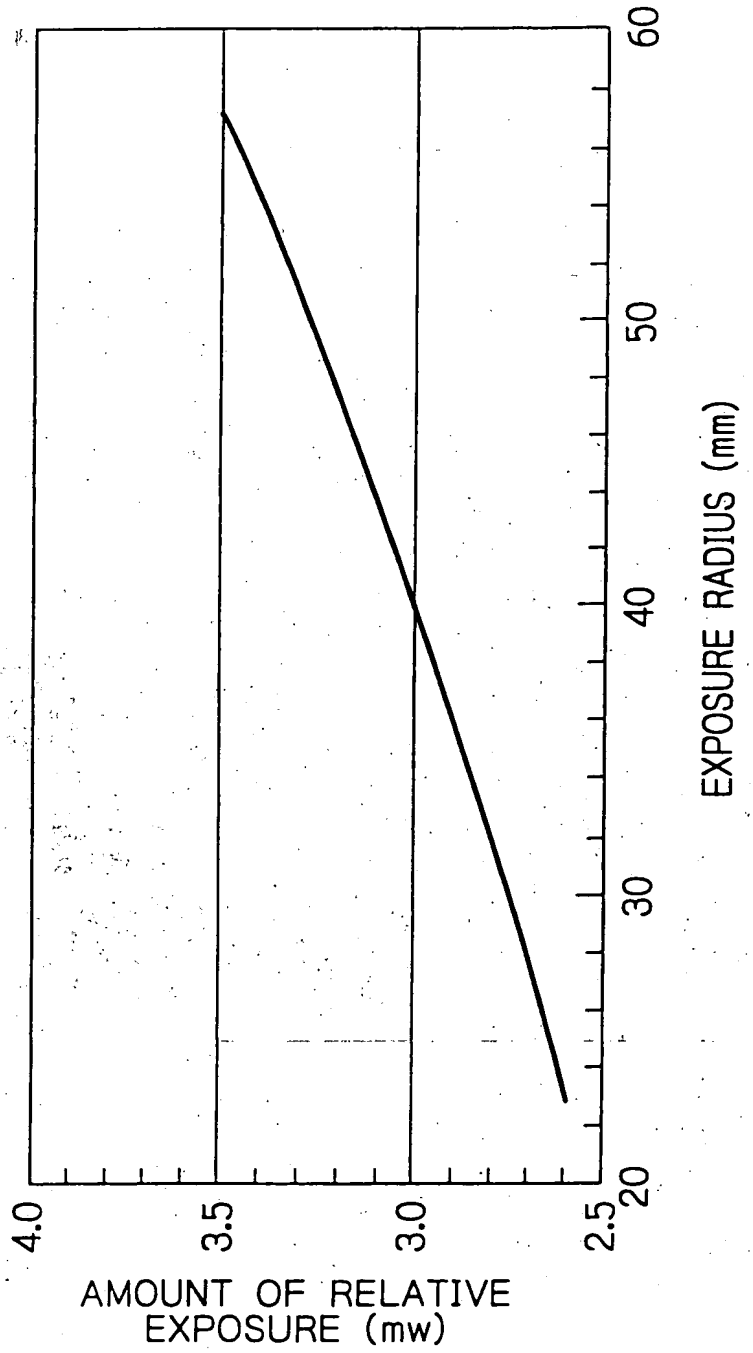

2200
2100
2000
1900
1800
1700
1600
1500
RESIST THICKNESS (Å)
20
30
40
50
60
GLASS RADIUS (mm)

Fig. 12


4.0
3.5
3.0
2.5
AMOUNT OF RELATIVE EXPOSURE (mw)
20
30
40
50
60
EXPOSURE RADIUS (mm)

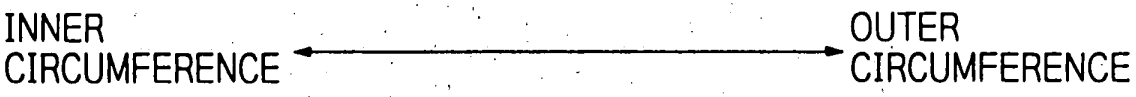


Fig. 13A

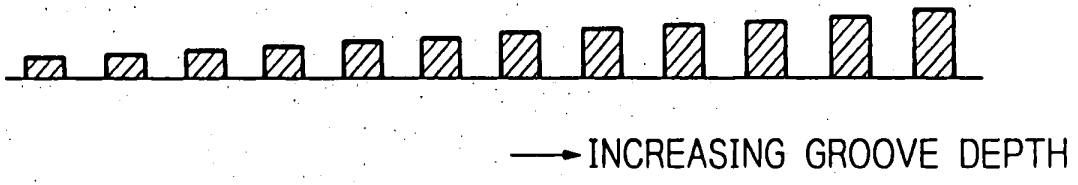
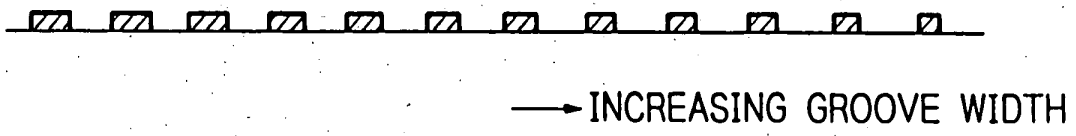



Fig. 13B